

# International LIDAR Mapping Forum in New Orleans, 7-9 Feb 2011

Recently Clive Fraser, the CRCSI Program 2 Science Director, attended this conference. It was the 11th in the series of what has become the leading international conference on LiDAR and laser-based mobile mapping systems (MMS). The focus of the conference is exposure of new commercial innovations and state-of-the-art operational aspects. The majority of the 500 or so attendees were either practitioners or vendor representatives.

## Hot Topics and Challenges: A summary

1. The emergence of mobile mapping systems(MMS), and especially the meeting of needs for survey-grade operation (ie 2cm accuracy). With limitations in GPS+IMU systems due to GPS signal blockages and limits in current IMU resolution, surveys with MMS can require expensive supplementary ground control. An associated technology gap is then in the area of meeting the need for more comprehensive Mission Planning tools to handle enhanced control network planning for MMS.
2. Data fusion between imagery and LiDAR/MMS ranging data. Although LiDAR intensities are increasing in radiometric resolution, with 16-bit data now being recorded, the added capabilities that arise in feature extraction, mapping and modelling from co-registered imagery and LiDAR data are being increasingly recognised and exploited.
3. Data processing and current software limitations in the data-to-information conversion present the principal production bottleneck in LiDAR and MMS. Today’s airborne LiDAR systems can readily record multiple-return and waveform data at a density of 8 pts/m2, whereas MMS can capture 600,000 3D points per second. The requirement for ever increasing spatial resolution is diminishing, whereas the need for more powerful software tools is increasing.
4. Software limitations are most apparent in the area of automated feature extraction, modelling and classification. Whereas current systems can display a success rate of around 80% in the automated extraction and modelling of significant feature classes, eg house extraction, separation of vegetation from bare ground, transmission line modelling, the remaining 20% of work needs to be carried out manually. In order for data processing to keep pace with developments in data acquisition, the automated feature extraction and object classification operation must display a success rate of more like 99%. This remains a significant R&D challenge. Research progress in the area continues to be incremental. In recognition of this, much research attention is being focussed upon development of semi-automated rather than fully automatic feature extraction tools.
5. Higher speed geometric data correction continues as an development goal. At present, peak detection and subsequent 3D point determination is generally performed in hardware/firmware within discrete return airborne LiDAR systems. The analysis of waveform LiDAR, however, which entails more than just the detection of multiple peaks within the fully recorded returning waveform, needs to be carried out through software, hardly any of which currently exists in the commercial marketplace. Waveform LiDAR has the potential of offering finer description (more peaks) and enhanced filtering, as well as beam orientation and characteristic responses to aid classification (eg concrete versus grass).
6. There is a need for more comprehensive geometric data processing tools to accommodate both the merging of point cloud data from multiple, overlapping LiDAR strips and the fusing of airborne LiDAR and MMS data. Data ‘adjustment’ approaches akin to photogrammetric aerial triangulation and block adjustment are needed, especially in regard to estimation of data accuracy and reliability.